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ABSTRACT

This handbook tells 15 stories of deaf or hard-of-hearing students and their teachers who have woven technology into their classrooms. The teachers were identified in a federally funded survey which sought innovations involving technology and media. The technologies involved include everything from a videocassette recorder to the World Wide Web. The stories tell of such learning activities as teaching American Sign Language to students at five remote schools through a distance learning network, teaching students to use a TTY, creating videotapes of students retelling books, interviewing successful deaf adults, and using multimedia presentations to teach classics. Together, the stories identify such best practices as helping students communicate, providing highly visual learning environments, making it safe for students to ask questions and make mistakes, and helping students develop thinking skills by solving real-world problems. Each story lists a contact person willing to provide additional information. A discussion of funding sources and a list of resources conclude the handbook. (JDD)

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SUCCESS STORIES

Deaf and Hard-of-Hearing Students Learning with Technology & Media



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Dear Educator,

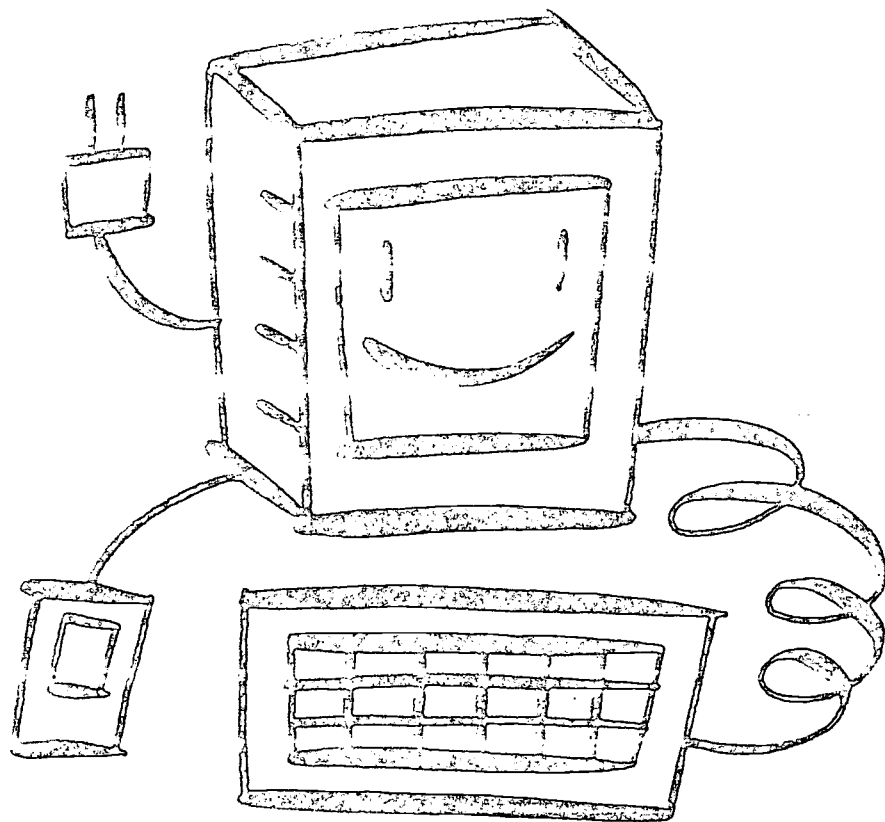
Educational technology is transforming the way teachers teach and students learn. Are teachers developing creative ways to use these technologies in educating deaf and hard-of-hearing children? Based on our survey results: *Definitely*. In more than 18 months of surveying, interviewing, and visiting classrooms nationwide, we discovered many teachers who harnessed the power of technology to affect the lives and learning of deaf and hard-of-hearing students.

What is technology? As you will see in this handbook, it is everything from a VCR to the Internet's World Wide Web. It is a process as simple as taking photographs and as complex as teaching American Sign Language to students at five remote schools through a distance learning network. It is a tool that offers teachers rewards, insights—and sometimes—frustrations. But most often it is a way for teachers to reach students as they never have before.

While technology is many things, there is one thing it is not: A sure-fire fix to the educational challenges that deaf and hard-of-hearing students face. Rather, it is part of a mix of many teaching strategies, each one suited for its purpose.

This handbook tells the stories of teachers and students in 15 settings who have woven technology into their classrooms. Their stories represent a cross section of what we found during our U.S. Department of Education-funded survey. We believe the best practices include those that help students communicate, provide highly visual learning environments, make it safe for students to ask questions and make mistakes, and help students develop thinking skills by solving real-world problems.

While many of these success stories came about because a school received special funding, others are a product of resourceful teachers. Make sure to read our Funding section for ideas to get you started and our Resources section to find out more about the products and ideas in this book.



We hope these stories will inspire you as they have us. Share them, and the ideas they spark in you, with co-workers, administrators, and parents. Each story lists a contact willing to help you get started. Often the first step is the hardest, whether it is calling a potential funder, making an appointment with your administrator, or signing up for a computer course. Take that step and you likely will find the rewards are worth the effort.

We wish you the best of success.

Mardi Loeterman
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for Accessible Media
125 Western Avenue
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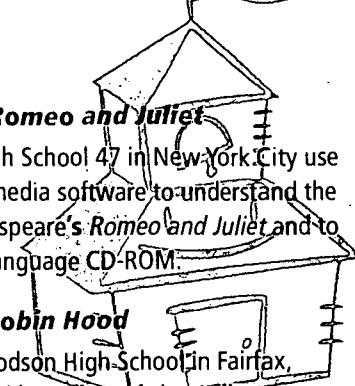
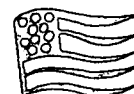
Judith Harkins, Ph.D.
Gallaudet University
800 Florida Avenue, NE
Washington, DC 20002



Our Survey: How We Found Our Teachers

In the winter of 1994/95, we conducted a qualitative survey, funded by the U.S. Department of Education, in which we sought innovations involving technology and media. We first networked with experts in technology and media to identify schools and individual teachers who were doing noteworthy work. Our sources led us to 92 teachers and other staff at 47 schools (23 public schools and 24 special and center schools). Each person interviewed detailed a specific teaching and learning practice. We asked how the practice began, how the teacher learned to use the technology, the cost of the equipment, how it was funded, how staff evaluated the learning benefits, and the school's plans for technology in the future. Measuring the effects of technology on academic achievement was not a high priority of the teachers and schools we contacted. Instead, educators viewed attempts as successful if they saw progress and students showed enthusiasm.

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At Maryland School for the Deaf, students of all ages and abilities learn to use a wide array of telecommunications tools, gaining literacy skills and independence along the way.

3 Catching the Story on Tape

The San Francisco Hearing and Speech Center's K-2 students read and retell stories using oral language, pictures, word processing, and ultimately videotape, which provides opportunities for teacher assessment, sharing at home, and enthusiasm among students.

4 Desktop History

High school history students at the California School for the Deaf in Riverside use desktop publishing software on in-class computers to create newsletters covering varied topics from a historical period.

5 Students Take to Spotlight

Students at Pennsylvania's Susquehanna Township Middle School use videotape, TTY, photography, and expressive language to prepare for and host visitor days, when adults from the deaf community address the class on a unit-related subject.

6 Capturing Students with Captioning

Students in the CAPS Collaborative at Reingold Elementary School in central Massachusetts work through the writing process to create their own captioned narration for existing and class-made videotapes, using a captioning workstation designed for the classroom.

7 Branching into Multimedia

A teacher at Ashland Elementary School in Kentucky includes the hypermedia program LinkWay in a unit on trees, allowing her students to demonstrate with multimedia what they have learned.

8 Bringing Learning Home

Parents learn American Sign Language (ASL) from videotapes their children make at The Learning Center for Deaf Children outside Boston—enhancing communication between parent and child and raising self-esteem among students with special needs.

9 Networked Learning

Students at Kendall Demonstration Elementary School in Washington, D.C., use the Electronic Networks for Interaction lab to gain familiarity with technology, improve reading and writing skills, and learn from one another.

10 Interacting with *Romeo and Juliet*

Students at Junior High School 47 in New York City use computers and multimedia software to understand the complexities of Shakespeare's *Romeo and Juliet* and to help produce a sign language CD-ROM.

11 Multimedia and *Robin Hood*

Educators at W. T. Woodson High School in Fairfax, Virginia, use captioned laserdiscs of classic literature and graphic organizers to teach literary genre to students in a highly visual way.

12 Bridging the Distance in Maine

Deaf, hard-of-hearing, and hearing students at Houlton High School and four other locations satisfy their foreign language requirement by studying ASL through a distance learning network in Maine.

13 Virtual Museum Opens Doors

Students at the Texas School for the Deaf create a virtual museum of computer art by learning and writing computer programs using various authoring tools.

14 Getting All the Answers

Como Park Elementary School is one of several St. Paul, Minnesota, schools to use Discourse—an in-class computer network through which teachers receive immediate written feedback from all students.

15 Teaching the Teachers

Florida School for the Deaf and Blind takes a systematic approach to technology training for teachers, including required and voluntary courses, in-service workshops, technology support, and conference attendance.

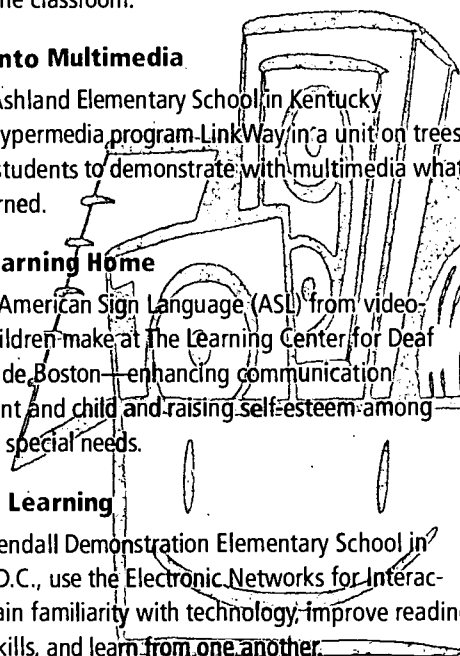
16 Cyberteaching Science

Using NASA satellite images and other data from the Internet, students at the Model Secondary School for the Deaf in Washington, D.C., take on real investigations in earth science, and share results with a network of other students and scientists.

17 Raising Funds for Technology

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Calling All Students



Schools

Maryland School for the Deaf

Location:
Frederick, Maryland

Participating Students:
More than 100 students.

Other:
Communication program emphasizes a bilingual language policy.

On a visit to Mary Sue Boxer's class, you might find a Spanish-speaking deaf student calling her sister through a relay operator who speaks Spanish. In another class, a student may be sending an electronic mail (e-mail) message to his father. In still another, students take turns using a telephone line simulator to learn the basic parts of a telephone conversation: greeting and setting up the call, transacting the reason for the call, and closing. (A telephone line simulator allows two telecommunications devices to communicate without having to use a real telephone line.)

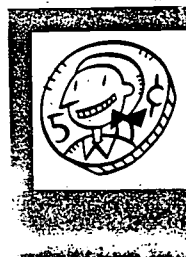
These are only a few of the many examples of telecommunications education at the Maryland School for the Deaf, which in 1980 began to incorporate telecommunications into its curriculum and is now updating its technology, instructional methods, and curriculum.

Mary Sue, who is deaf, teaches telecommunications to more than 100 children of varying ages and abilities. In

the past two years, she has been able to introduce newer kinds of technology such as computer-

based TTYs, e-mail, and fax machines, as a result of participation in Gallaudet University's Project TFA: Telecommunications For All. The goals of Mary Sue's courses are to improve independence, literacy, and communication skills, while equipping students with a full understanding of visual telecommunications.

The walls of Mary Sue's classroom are lined with resources: phone books from all over the state, the International TTY Directory (blue book) published by Telecommunications for the Deaf, Inc.; worksheets;



Funding

Project TFA:
Telecommunications for All was funded at Maryland and four other schools by the U.S. Department of Education.

curriculum objectives; video materials; and other instructional supports. All help meet the goal of teaching children practical and accessible means of communication.

Next door, speech therapists Tamara Bossler and Lisa Gastelle are using telecommunications technology to teach a unit on idiomatic English. A hard-of-hearing student, who cannot hear well enough to understand unfamiliar voices on the phone, calls a local clothing store through the relay service and inquires about the availability of sweaters. The student speaks directly to the store clerk; the clerk responds through the relay service operator, who types the clerk's words on the TTY. This method of communication, called voice carry-over, is a required aspect of relay services nationwide.

The clerk tells the student there are just a couple of sweaters left, and they run from \$25 to \$50 on sale. Teachers Tamara and Lisa then explain the usage of *just a couple left* and *run* in English. They reinforce the learning through additional activities, such as a game of Concentration in which students pair colloquial phrases with their meanings.

Supervisor Bob Dorrell reports that parents take an avid interest in their children learning modern methods of communication, and that telecommunications technology is making its way into more and more Individual Education Plans (IEPs). Teachers report students are highly motivated by activities involving telecommunications.

Resource

See Telecommunications, page 18, for more about:

Project TFA: Telecommunications For All curriculum objectives

Project TFA: Telecommunications For All videotape
telephone line simulators

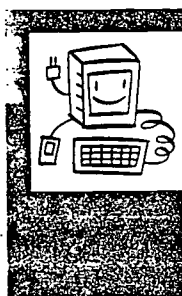


Contact

Mary Sue Boxer
Maryland School for the Deaf
101 Clarke Place
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Frederick, MD
21705-0250
Tel: (301) 620-8500
(voice/TTY)

Equipment

three computer workstations with modems and software
two outside phone lines
phone flashers
fax machines
several kinds of TTYs
a commercial online service
eight simulated phone lines



A student learns how to use the TTY in a telecommunications class.

Catching the Story on Tape



School

San Francisco Hearing and Speech Center, Hearing-Impaired Department

Location

San Francisco, California

Participating Students:

Six students in a K-2 classroom.

Other

The school follows an oral/aural approach. Students communicate through speech, listening, and lip-reading.

Jeanne Hirota's students at the San Francisco Hearing and Speech Center are 5 to 8 years old. One way she helps them develop literacy skills is through their retelling of books using video. Students first read and discuss an age-appropriate book. (Jeanne generally selects books with more than one character and with some repetition.) Next, students focus on sequencing events and retelling the story using their own words orally, with pictures, and in writing. Then each student chooses a role from the story that usually has two or three sentences. Students type their lines into a computer and have the printed text laminated into book form. They use the text as a study aid to help them memorize their roles. Finally, students play their roles on video.

The Students and Jeanne make about five or six videos each year, spending about two weeks on each, from beginning to end. The videos serve several purposes:

- Jeanne studies each video to identify areas in which particular students need more focused instruction.

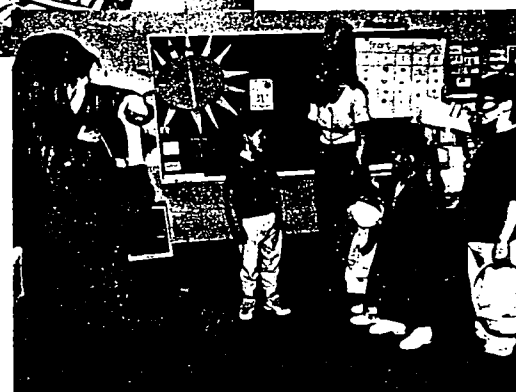
- Children share their work with their families.
- Students are aided in recall and comprehension.
- Jeanne assesses students' speech skills over time.
- The class views the videos later in the year, when a story relates to an upcoming classroom theme, or just for fun.

Jeanne, working with an aide, uses the story retelling process as an opportunity to work on speaking, writing, listening, story sequencing, and other literacy skills. "It's a great way to work on speech skills

without focusing on it so directly," explains Jeanne. "I tell the children to speak clearly so that other people can understand them. When they're talking for the videotape, they're willing to give their speech more effort."



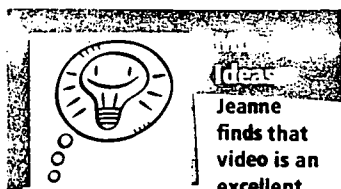
George T. Kruse for WGBH



Students type out their roles on computer. Later, teacher Jeanne Hirota videotapes the class acting out the story.

Jeanne started using the video retelling activity in 1995, adopting it from Mary Ann Younger, the previous K-2 teacher. Although Jeanne was at first intimidated, worried about costumes, sets, and how the product would look, she soon saw that it wasn't necessary to be elaborate. Students enjoyed the simplest embellishments, such as rabbit ears or a paper mask. Mary Ann advised her, "Don't get stuck on the idea that it has to be perfect, because these are little kids. They have their own direction. The idea is to keep it fun."

Students' skills with recall, sequencing, and language competency are highest on those books which they have acted out, note Jeanne and Mary Ann. They are convinced the process improves students' comprehension, expands their vocabulary, improves their reading, and provides an arena for expansion of creativity and imagination. Best of all, students are enthusiastic about the activity and proud of their work.



writing prompt. With ready access to a camcorder, she uses it throughout the year to record field trips or special activities at the school. For example, after she videotaped a Chinese New Year event, Jeanne played the tape before her students began writing about the event to remind them of details they saw and to promote discussion of new vocabulary.

Contact

Pamela Hefner
San Francisco Hearing and Speech Center
1234 Divisadero Street
San Francisco, CA 94115
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(415) 921-8990 (TTY)

Desktop History



School
California School
for the Deaf

Location
Riverside, California

**Participating
Students**
Eight to ten students
per class.

Other
Some students are
from non-English
speaking backgrounds.
Students' range of
English language
abilities, background
knowledge, and skills
varies widely from
year to year.

Todd Rutherford teaches high school history, focusing on the nineteenth and twentieth centuries and events spanning from the Civil War to the Vietnam War. Todd teaches the content of history through student inquiry and research. Rather than write traditional reports, students often create a newsletter to share what they've learned with classmates and other members of the California School for the Deaf.

"In the old days, my students would never read someone else's history report, but they love to read the newsletters we produce," says Todd. "They want to read each other's work; they want to give it to their parents." Putting many short reports into newsletter format also helps students see a variety of topics and relationships of many different events during the same period of history.

Todd points out that the newsletter, which the students produce on a computer, is merely a strategy. Their real task, he says, is finding information and communicating it. After introducing the class to the historical period, Todd gives each student a packet containing background readings; a list of events, places, and people that students may choose to write

about; and a structure for their writing assignment. Several print and electronic resources are available in the classroom.

Students are evaluated on the extent of their research, the quality of their notes, and the organization and content of their report. Writing abilities within

the class vary widely. Since the purpose of the newsletter is to communicate information to a general audience, Todd works with students to help edit their reports.

Todd learned about computers by working with them. Most important, he works in an environment supportive of technology. Several colleagues who use similar technology learn from each other. For example, journalism teacher John Vollrath also produces a newspaper with his students. John says newspapers motivate students to take their writing seriously and to read. John's journalism students learn to create stories, report news, scan photos, and edit articles for a bimonthly school newspaper.

Todd says he couldn't do the newsletters if he didn't have the equipment in his classroom, because the computer lab is not conducive to this kind of project. At the same time, Todd admits it's tricky to coordinate time for all the students on one classroom computer. "It's always a balancing act," he says. To manage time on the computer, Todd has students do their thinking and initial composing and editing at their desks. He schedules enough tasks to keep students busy while they wait their turn on the computer, at which students input, scan, print, and edit.

Songs of World War I* By Jolene LaFranco

People loved to hear the popular songs of the First World War. They were important because they were romantic, patriotic, political and humorous. They were about the way people felt during the emotional times of war. These songs tried to make people support the war effort and help the boys who fought in the war. They also tried to make people love and support each other here in America. Times were hard and songs gave people good things to say and to think about. Here are some famous songs from 1914 to 1918. The first is a political song by Alfred Bryon and Al Piantados. "I Didn't Raise My Boy To Be a Soldier."

...song lyrics...

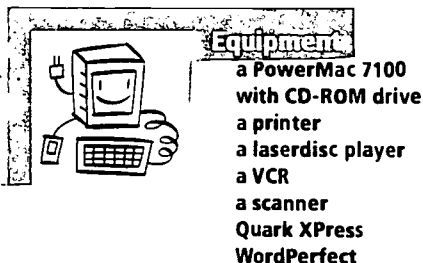
This song showed how most mothers felt about sending their sons off to war and the fear of losing them. The mother in this song didn't want her son to kill others, that's not what she taught him....

...An example of a humorous song is "Oh, How I Hate To Get Up In The Morning" by Irving Berlin. It makes fun of Army life.

...song lyrics...

This song shows how the boys felt about getting up early for drill and practice. They're just lazy guys like they were before the war and want to sleep late like always. All of the songs of 1918 were an important part of the war. The songs are interesting because they tell of bravery, humor, and feelings about the risks of war. The songs made people feel better during a scary time and they were as popular in 1918 as rock and rap songs are now.

* Excerpt from the history newsletter. Song lyrics and some additional student text has been deleted due to space constraints.



Contact
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(909) 782-6501 (TTY)

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Students Take to Spotlight



School
Susquehanna Township
Middle School

Location
Harrisburg, Pennsylvania

**Participating
Students**

Approximately sixteen
fourth through eighth
graders each year,
including one
elementary and one
middle school class.

Other
Degree of hearing loss,
communication skills
and preferences, and
academic abilities vary
widely.

Contact

Kathleen Eich
Susquehanna Township
Middle School
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(voice/TTY)

Karen Ruddle
Capital Area
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Services
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P.O. Box 489
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Tel: (717) 732-8400
ext. 534 (voice)
(717) 732-8422 (TTY)

Rick Aurand is a pilot for Federal Express. He also happens to be deaf. He is answering questions from two students at the Susquehanna Township Middle School about growing up deaf, his family, and his job. One student is operating a video camera, another is in charge of camera lights, and a third is taking photographs. The audience of classmates, teachers, and parents is spellbound.

Rick is one of more than a dozen deaf and hard-of-hearing adults who have been invited to the school as part of The Spotlight Program created in 1993 by teachers Kathleen Eich and Karen Ruddle. The teachers wanted to improve students' communication skills, including reading, writing, and oral and sign ability.

Students spend about a month preparing for each visitor's day, which is always tied to a theme. Travel was the theme when Rick visited. In preparation, the class read travel brochures and related books, learned about persuasive writing, and wrote their own brochures.

Students use their classroom TTY to telephone guests and plan visit logistics. Two classroom computers make the writing process less tedious and more productive than writing with paper and pencil. Students work on the project during Language Arts class and Study Hall. Each month's program requires about 5-10 hours of teacher preparation time outside of class.

Videotaping each event gives the project a life beyond the day of the event and promotes family interest and classroom involvement in the project. During the summer, the teachers compile a year's worth of video onto one tape, which is available for loan to the students' families and guests. Students write summaries of the event to be included in a scrapbook.

Themes have included characterization, family, discrimination, education, and goals and dreams. Guests have represented a range of backgrounds. Among others, guests have included the pilot, two postal workers, two computer professionals, two professionals from organizations that serve the deaf community, and a farmer. "It's great for the students to see the diversity in the community," says Kathleen. "The guests are successful in their lives, regardless of their degree of hearing loss or type of communication preferred."

Kathleen, Karen, and the other teachers have seen significant improvement in the students. One example is live interviewing skills. With practice, students have become adept at predicting how guests will answer questions and at reformulating their question list on the spot as they listen to and interpret responses.

The social benefits are also high. "Their social skills, etiquette, self-esteem, and pride have grown," Kathleen says. "They also feel more comfortable with deaf adults and have come to know people in the deaf community."

As part of The
Spotlight Program,
two students
interview a mail
handler. A third
student (not shown)
operates a video
camera.



Capturing Students with Captioning



School
CAPS Collaborative,
Deaf and Hard-of-
Hearing Program, at
Reingold Elementary
School

Location
Fitchburg, Massachusetts

**Participating
Students**
Two to eight students
from upper elementary
grades.

Other
Language and commu-
nication abilities vary.
Classroom communica-
tion includes all modes,
from ASL to speech.

Five students sit in a semicircle, holding clipboards and watching a videotape about Mesa Verde and Anazasi Indian culture. Sheila Donahue, a teacher at Reingold Elementary School, plays a short scene and pauses the tape. The students, between 8 and 11 years old, write a sentence or two about the scene. They refer to a vocabulary list they developed in a previous brainstorming session and recall information they learned during their recent Mesa Verde unit. They go through the same process for 14 scenes.

Now the students take turns typing their sentences into a computer in the classroom. One student writes, "That is hard to make a basket from a yucca plant." Sheila's computer is part of a captioning workstation. When the students have revised and checked their work, they can add their sentences to the videotape using captioning software, QuickCaption for Word, and a special decoder. The captioning step is highly motivating for the students. "They are proud to make their own captioned video from their own sentences," says Sheila, adding that it is a great culminating activity to a unit several weeks long.

"The children mastered most, if not all, of the

content vocabulary and factual information, much more than I've seen in the past with similar units," Sheila reports. "With

captioning, students really retain the information. I think it's a combination of the visual nature of the technology and the fact that they review the information several times in different forms."

When Sheila first received her captioning equipment, she undertook a simple writing project. She asked two students to view a silent videotape and

narrate it with captions. The video was about Deaf Field Day, a social event involving schools from eastern Massachusetts. The students worked as a team, brainstorming what to say and taking turns

writing. They followed a standard writing process: printing drafts, discussing revisions, and editing on the computer, with as-needed assistance from Sheila. "They paid a lot of attention to their English," says Sheila, "because they knew other people would view the final captioned tape."

Sheila's most recent activity was a mathematics project. "I began to think about the trouble my students have with word problems. Expressions like *how many more than*, *how many in all*, and *how many left* really throw them off." Pairs of students created skits involving addition or subtraction problems using manipulatives, recorded them on videotape in ASL, composed the word problems in written English, and captioned the tape—ten problems in all, which all of the students solved.



**More
Ideas**
Another
Reingold
teacher,
Tammy

Tonry, used captioning technology to develop the English skills of students ages 7 to 9. She videotaped each student telling a story (20-40 seconds) in ASL. Then she worked with the student to write the same story in English using captions. Tammy said, "It's usually so hard to explain how English is different from sign, but with the video and text in front of them, it was easier for students to understand. Plus, they loved seeing themselves on the screen. The activity was really motivating."



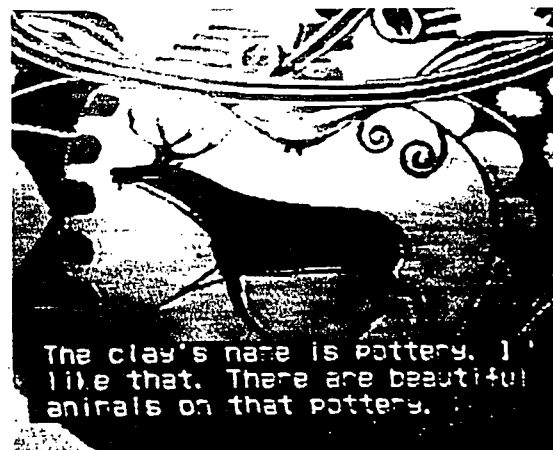
The CAPS Collaborative at Reingold was one of six programs participating in the Personal Captioning Project, funded by the U.S. Department of Education.

Contact
Sheila Donahue
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Groton, MA 01450
Tel: (508) 448-3617
(voice/TTY)



See Videotape Captioning, page 18, for more about: Videotape and idea book on ways to do captioning in the classroom

See Captioning Software, pages 19-20, for more about: ULTIMate CaptionWorks (Macintosh) QuickCaption School (DOS) QuickCaption for Word (Windows) CAP-Media Tools for digital video captioning and multimedia authoring (Windows)



A student-captioned video shows what a student recalls from a unit on Mesa Verde.

Branching into Multimedia



School
Ashland Elementary
School

Location
Lexington, Kentucky

**Participating
Students**

Eight students,
ages 6 to 11

Other

Students work in a
separate classroom
part of each day.
Hearing losses (aided)
range from mild to
profound.

Cathy Brandt was teaching a unit on trees and considering ways her students at Ashland Elementary School could express their new knowledge. She had recently acquired computer software called LinkWay and decided to give it a try. The software allows her students to draw, write, and combine text and illustrations. Just as with word processing software, students can easily revise and improve their work, something not easily done on paper.

LinkWay is one of a number of programs known as hypermedia that allow users to combine words and pictures—and sometimes sound and moving video—onto computer screen pages. These pages may be linked sequentially, like a narrative that has a beginning, a middle, and an ending, or in a branching fashion that allows them to be viewed in any order.

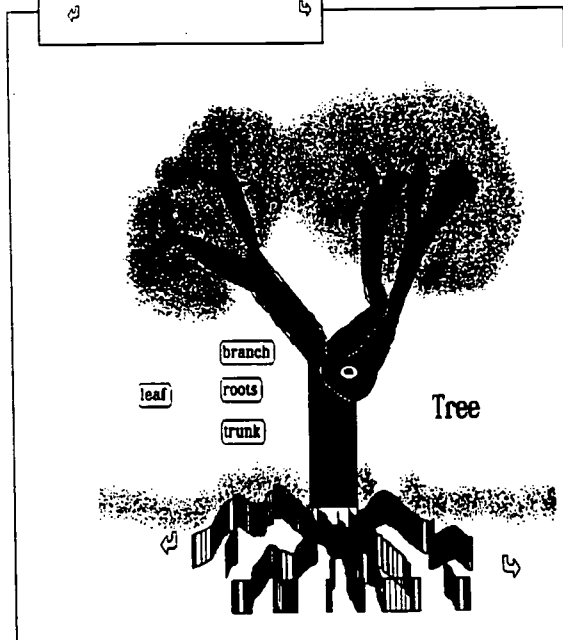
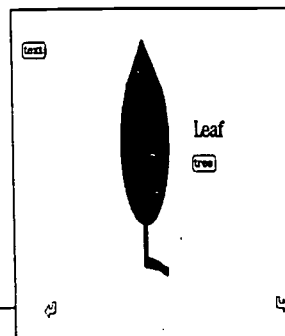
When Cathy saw the potential for LinkWay to motivate her students, she was convinced even the youngest ones could master it. Since neither she nor her students had hypermedia experience, they spent two weeks just learning the program—how to draw and paint, add text fields, and create links between screens.

The month-long unit on trees combined research skills, writing, art, problem-solving, and science

content. Each student adopted a different kind of tree and spent two weeks

researching various aspects—such as the trunk or the leaves—followed by two weeks writing about their trees and creating multimedia presentations.

The project was well-suited to the students' varied abilities. For example, while more advanced students learned about photosynthesis, others focused on labeling tree parts. The presentations gave Cathy an effective way to assess students' knowledge. Plus, all were proud to show their work.



Using LinkWay software, a student creates several linked pictures for a unit on trees. The user can get more information by clicking on the other buttons.

Computers are as important to Cathy's classroom as any other materials. She has two IBM PCs and a printer in her classroom and shares two other computers with the teacher next door. Cathy, who is self-taught in computer basics, was first exposed to computers in the school's computer lab, which provided drills and keyboarding instruction. Seeing the potential to enhance her students' learning if she had ready access, she aggressively worked to get computers in her classroom.

Because Cathy believes elementary students need a variety of experiences and interactions every day, she limits daily computer use to roughly an hour per student, often in small doses. "Computer time gives them experiences they can't get otherwise and my students are more willing to repeat an activity, for example, reread a story, when they're on the computer. So, it's important. But I try to balance it with other ways of learning."



See Internet, page 18, for more about:
EDUDEAF, an electronic discussion group
for educators and parents of deaf and
hard-of-hearing children started in
1995 by Cathy Brandt

Contact
Cathy Brandt
Ashland Elementary
School
195 North Ashland Avenue
Lexington, KY 40502
Tel: (606) 255-2890 (voice)

Bringing Learning Home



School
The Learning Center
for Deaf Children

Location
Framingham,
Massachusetts

**Participating
Students**
Fifteen to twenty-two
special needs students.

Other
Students have
cognitive, linguistic
and/or developmental
delays; some are in
self-contained settings
and others are
integrated but receive
special services. The
school follows a
bilingual-bicultural
approach, in which ASL
is the primary language
of instruction and
written English is
emphasized as a
second language.

Like all parents, Betsy and Doug Roberts want to be able to communicate well with their children. Luke Roberts, who is nine years old, attends The Learning Center for Deaf Children outside of Boston, Massachusetts. As a result of serious medical problems during the first four years of his life, Luke didn't begin learning language until his health improved. Then, when he wasn't picking up language as quickly as expected, doctors discovered a visual impairment. The Roberts sometimes felt overwhelmed.

Betsy and Doug borrowed sign language videotapes and took classes, but found the content to be either too advanced or not relevant to their immediate needs with Luke. On the other hand, videotapes made by Luke's teacher, Debbie Shupe, have been extremely useful for Luke and his family.

One set of videotapes related to the folk tale *Stone Soup*. Over several weeks, Luke and his classmates read and retold the story, acted it out, drew pictures, practiced sequencing, made soup, and rewrote the story in their own words. Such an experiential and repetitive approach is not uncommon in classrooms for deaf or other special needs children. Specialized videotapes for parents, however, are uncommon.



The Learning Center staff uses video extensively to evaluate students' communication skills. Supervisors and teachers study the videos and advise teachers on new strategies. The Speech and Language Department uses video to track the progress of students' communication abilities. The same videotapes may be consulted in preparation of Individual Education Plans (IEPs).

Videotape production has varied depending on the needs of the children in any given year. Teachers may make two or three tapes during a unit. For an initial tape, a teacher or aide signs a dozen vocabulary words from a story. This gives parents basic language for reading the book with their child. Later in the unit, each student signs the whole story on tape and brings it home.

Betsy felt the tapes directly addressed her family's needs. The tapes helped to improve her communication with Luke—unlike ASL classes or videos. "The tapes were great because the vocabulary was right on target. We had an immediate use for the material."

Susan Dulgov, coordinator of the special needs program, says teachers are enthusiastic, even though making the videotapes takes up to two extra hours per week. "Our goal is to encourage families to interact," Susan says. "Parents look forward to the videotapes and always ask for more." As for the students, Susan says, "They typically have low self-esteem because they are successful at so few things. When they make their own videotapes, however, they receive a strong message from both school and home that they are important."



Jeffrey Dunn for WGBH



Luke Roberts is videotaped signing cow. Later, he teaches the sign to his mother, Betsy.

Contact
Susan Dulgov
The Learning Center
for Deaf Children
848 Central Street
Framingham, MA 01701
Tel: (508) 879-5110
(voice/TTY)

Networked Learning



School
Kendall Demonstration
Elementary School

Location
Washington, D.C.

**Participating
Students**
Upper elementary
students, ages 11 to 14.

Other
Students communicate
through English and
sign language.

Yetti Sinnreich feels an urgency to provide her students with the ability to use computers as well as to expose them to practice with written English. To accomplish both goals, she uses the Electronic Networks for Interaction (ENFI) lab at least once a week with her students at the Kendall Demonstration Elementary School.

For the past 12 years, Yetti has regularly held classroom sessions in the ENFI lab, where all communication takes place through reading and typing on computer. Several computers are hooked together in what's called a local area network. The computers face the wall so students don't face each other and are less tempted to communicate with each other through the air. Other teachers have chosen different configurations.

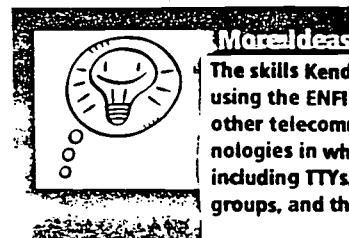
Kendall's ENFI lab uses a type of "chat" software, which allows for real-time communication. Each

student reads what the teacher and other students write, and composes messages to send to the others.

Some children,

who are self-conscious about typing and spelling at first, start out as "lurkers." They watch but do not type.

Yetti advises that students use ENFI no earlier than third grade, because at earlier ages they may not be ready for keyboarding. She typically introduces a topic through a discussion in the classroom, such as a theme of a book they have read in class. Then students take up the same topic in an ENFI session,



The skills Kendall students learn by using the ENFI lab are transferred to other telecommunications technologies in which they are involved, including TTYs, e-mail, Internet chat groups, and the World Wide Web.

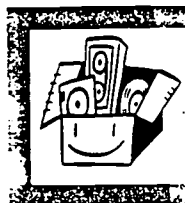
which Yetti moderates. The software allows her some control over the interaction. For example, she can freeze the discussion to point out something to the whole group. She frequently uses worksheets for homework to help assess how much students have learned from a previous day's lesson.

In some classes, Yetti turns the role of moderator over to one of the students. She explains the benefits: "I see modeling, and I see kids learning from each other, even when they may not be typing at first."

ENFI is flexible enough to be used in a variety of ways. One of Yetti's favorite activities involved pairing 11- and 12-year-old students with younger students who were not ready for ENFI. The younger students signed to the older students, who then typed that message onto the network. "It was a great activity. The older kids felt so accomplished, and the younger kids had their eyes opened to the technology."



Funding
The ENFI lab began in 1985 as a project at Gallaudet University, Washington, D.C. with assistance from the IBM Corporation.

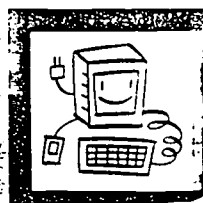


Resources

See *Classroom Computer Networks*, page 18, for more about:

Making English Accessible: Using Electronic Networks for Interaction in the Classroom
by Joy Kreeft Peyton and Martha French

Contact
Yetti Sinnreich
Kendall Demonstration
Elementary School
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5031 (voice)
(202) 651-5099 (TTY)



Equipment
one computer as a file server with at least 8 MB of RAM, a speed of at least 66 MHz, and storage memory above 500 MB
Windows NT on the file server
student computers, which need not be as well-equipped in terms of RAM, speed, and storage
Windows 3.11 for Work Groups on the student computers
one printer serving the network is recommended

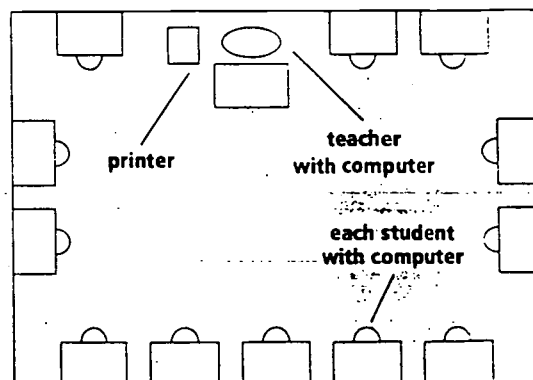


Diagram of ENFI lab at Kendall Demonstration Elementary School. Other schools use different configurations.

Interacting with *Romeo and Juliet*



School
Junior High School 47

Location
New York City,
New York

**Participating
Students**

Twenty-four 15- to
17-year-old students,
all profoundly deaf.

Other
Students communicate
through sign language
and speech.

It used to be that Terry Cambridge, a teacher at Junior High School 47, could tell you a lot about literature, but little about technology. All that changed two years ago when media coordinator Susan Abdulezer offered Terry multimedia assistance to teach Shakespeare.

Terry was convinced that deaf students could read the same stories as hearing students if they had visual access to critical information. She took advantage of the interactive nature of the computer to help her students understand the vocabulary of *Romeo and Juliet*.

Many of the 100 words Terry selected to teach were unknown to her students, who were from four different homerooms and were below grade level in reading. Terry provided modern English translations for words that needed it, collected texts with pictures illustrating many of the words, and used her one in-classroom computer to help instill comprehension.



Resources

See ASL Resource Software, page 20, for more about: *StreetSigns: A City Kid's Guide to American Sign Language*, a CD-ROM developed by JHS47 students and staff.

can then be linked sequentially or in a branching fashion. Under Susan's guidance, students produced artwork and signs to accompany the words they learned, which provided the basis for a glossary they would later use to reinforce vocabulary.

By the end of the year, Terry's students understood more than just what the words represented. They had come to understand the meaning and nuances behind the words well enough to produce a school play.

With computer support, students really came to understand the text, Terry says. "The computer is like having an extra teacher, but that teacher is not judgmental. It's a wonderful resource. It doesn't replace actual teaching, but picks up where I leave off."

Terry is one of several teachers brought by Susan into one of the school's technology efforts, the HyperSign Immersion Project. Susan, who taught herself about technology when she was a classroom teacher, now trains teachers throughout the school district. Within her own building, she approaches teachers one-by-one with an idea and hooks them into technology bit by bit, mentoring along the way.

Although it is a slow process, Susan has found it works. Once teachers see how technology can enhance their instruction, they start to generate their own ideas and come to rely less on Susan, as Terry now has.

More Ideas

The HyperSign Immersion Project supports the following disciplines:

- language and literature (Sharing Shakespeare)
- art (The Guernica Project)
- creative writing (New York Stories)
- vocational education (FingerPrints Press)
- reading for pleasure (Thank You Ma'am)
- elementary science (Interactive Classroom Project)

For example, Terry wanted to get across that Lady Capulet was proud, but in the sense of "haughty, looking down on others." She used mime, sign, and dialogue to communicate the meaning.

After six months of studying the play, students turned to HyperStudio software, one of a number of programs known as hypermedia that allows users to combine words and pictures—and sometimes sound and moving video—onto computer screen pages that

Contact

Susan Abdulezer
Junior High School 47
225 East 23rd Street
New York, NY 10010
Tel: (212) 679-1360 (voice)
(212) 481-0300
(voice/TTY)



A multimedia glossary of *Romeo & Juliet* includes English words and sign equivalents on video. This student is signing *haughty*.

Multimedia and Robin Hood



School
W. T. Woodson
High School

Location
Fairfax, Virginia

**Participating
Students**
Six students.

Other
Students have a range
of English language
abilities.

The students in Rosemary Stifter's high school English class are discussing characters in *Robin Hood*. They have read the book and watched the captioned movie on laserdisc, but some are confused about Robin Hood's relationship to other characters in the story. Within moments, Rosemary displays a graphic organizer with the characters' names on a computer screen. She hits a few more keys and on a 32-inch monitor, the students see Robin Hood and his father in an archery competition. Rosemary plays the 30-second scene from the movie twice, restates her question about the characters, and continues the discussion.

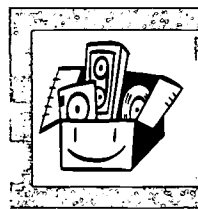
Rosemary, a teacher of deaf and hard-of-hearing students at W. T. Woodson High School, has taught several classics, such as *The Secret Garden*, *Sarah Plain and Tall*, *The Great Gatsby*, and *Treasure Island*, as part of a curriculum she and a fellow teacher developed on literary genre, known as the Genre

Project. Her colleague, Gretchen Kingan, teaches deaf students at the adjacent Frost Middle School. They learned the technology together and have each developed multimedia

presentations to teach character, setting, plot, and theme, plus literary techniques such as irony, analogy, and figurative language. They share materials with each other and with other teachers that have the same technology.

Before introducing her students to a new story, Rosemary prepares a set of multimedia supports. For example, she reviews the movie, identifies segments that illustrate difficult-to-teach concepts and vocabu-

Contact
Rosemary Stifter
W. T. Woodson
High School
9525 Main Street
Fairfax, VA 22031
Tel: (703) 503-4653
(voice/TTY)



Resources
See Multimedia
Demonstrations, page
19, for more about:
Project Alive!
videotape

lary, and indexes the segments on the computer. The ability to show movie scenes in random order is invaluable, Rosemary says. Teachers can create captions for some laserdiscs that are not captioned. These captions can be modified to better suit students' reading levels. Difficult vocabulary within the captions is linked to multimedia glossaries—which may include ASL signs, graphics, or text.

Rosemary, Gretchen, and several other teachers of the deaf learned to use this technology through Gallaudet University's Project ALIVE! The project provided for a workstation in each teacher's classroom, month-long workshops in the summer, and follow-up training and support during the year. Now Rosemary and Gretchen have become trainers for other schools that acquire the same technology. The literature units they have created include 12 stories from many genres.

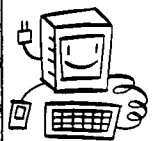
Rosemary admits learning the technology required a significant time commitment on her part, but she persevered because of its value to the students. "My students wouldn't have been exposed to so many classics without this technology," she says. "It would have been much more difficult to teach literary techniques such as irony. With quick access to movie clips and graphics, the students gain a better understanding than they would have without."

Funding

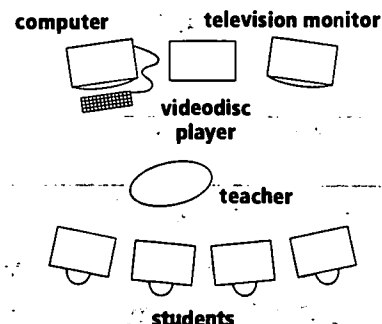
Project ALIVE! was funded at Woodson, Frost, and three other schools by the U.S. Department of Education.



Equipment



an IBM PC-compatible 486 computer, with a CD-ROM drive, sound board, video overlay board, video digitizing board and optical scanner
a videodisc player
several captioned laserdiscs
a 32-inch television with built-in decoder
a laser printer
Compel
Multimedia Toolbook 4.0 from Asymetrix
Microsoft Word
electronic encyclopedias and other resources
clip art
other utilities



Rosemary Stifter arranges her computer, videodisc player, monitor, and students so she can easily integrate the technology into her class discussion.

Bridging the Distance in Maine



School
Houlton High School
and four other high schools

Location
Houlton, Maine, and
four other Maine
locations

**Participating
Students**
One deaf and fifteen
hearing students in
Houlton, plus eighty
deaf and hearing
students in four other
locations.

Mardi Loeteman

When Sally Gatehouse teaches ASL I to nearly 100 high school students, not one of them is in her classroom. Sally communicates with her students at five schools in distant regions through a distance learning network. While she is located at the University of Southern Maine in Portland, her lessons reach students who would not otherwise have access to someone whose native language is ASL. Both ASL I and ASL II qualify for foreign language credit. When classes include a deaf or hard-of-hearing student or hearing students with deaf family members, students have an immediate need for the language they are learning in contrast to most foreign language classes. "They get more out of it in the end," says Julie Dunn Brown, Houlton High School's resource room teacher and supervisor of Houlton's class.

The ASL telecourse takes advantage of a distance learning network already in existence throughout Maine. Schools are linked by fiber optics (two-way video) or microwave (one-way video). Sally's classroom is set up like a simple television studio. The classroom has two cameras, one trained on the teacher and the other focused on visual images prepared for the lesson. A video engineer controls the cameras, as well as video from the remote sites, and selects the



Funding

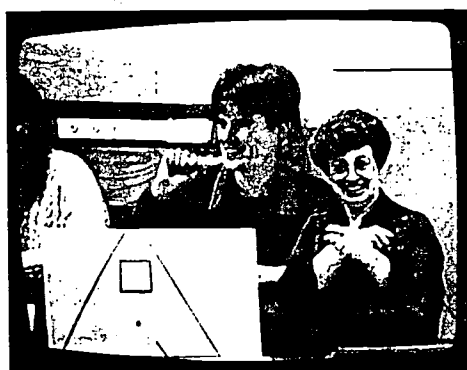
The ASL telecourse curriculum and procedures were developed with funding from the U.S. Department of Education. It is now funded by the State of Maine.

video for transmission to the participating schools. In a classroom wired for two-way communication, students can respond to questions and communicate to all viewers.

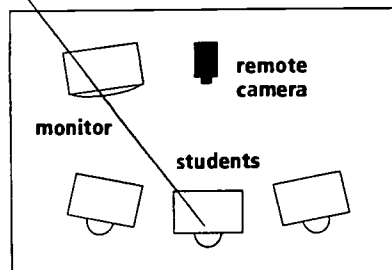
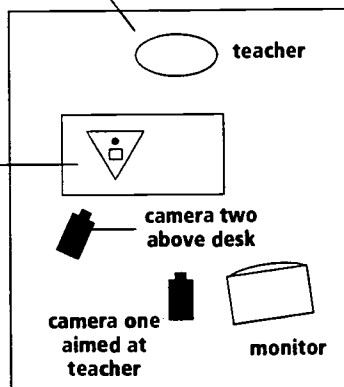
At Houlton, Matthew, who is deaf, is learning ASL alongside hearing classmates. Before he took the course, he relied on lipreading to understand other students. The class has enhanced his signing skills and given Matthew an opportunity to become much more socialized at school. His friends have learned to communicate more effectively with him.

While regular interaction between Sally and the students is limited to communicating by fax, Sally meets with the students twice each year to evaluate skills and provide feedback. Weekly class assignments are completed on lab day. Each student makes a videotape showing her or his ability to execute assigned ASL phrases and sentences and mails it to Sally for evaluation.

Overall, students and teachers alike praise the ASL telecourse. Many students claim they are getting much more out of the course than expected. A few have even gone on to study ASL in college. As for participating deaf students, Julie refers to Matthew's experience: "It's really opened up his world at school."



Contact
Barbara Keefe
University of Maine
at Augusta
46 University Drive
Augusta, ME 04330
Tel: (207) 621-3191
(voice/TTY)



Camera one videotapes teacher Sally Gatehouse from the front while camera two videotapes static images, such as charts. Additional cameras in remote locations can also transmit images for broadcast.

Virtual Museum Opens Doors



School
Texas School
for the Deaf

Location
Austin, Texas

**Participating
Students**
Twenty-six high school
students.

Shayne Blaylock is showing off a new museum at the Texas School for the Deaf. He guides a visitor through some of the museum's 26 pieces of original artwork, photos and movies of the artists, and text about the art and its creators. The visitor is suitably impressed, especially since she didn't have to take a single step—the entire museum is in a computer.

Created by Shayne and his fellow classmates, this virtual museum includes real paintings created with traditional media. Paintings are photographed and then scanned into the computer, along with art created using computer software.

Shayne signs that making computer art is totally different from traditional ways of creating art. He

explains that on the computer, one can layer images—superimpose one image over another—and manipulate them to create

a new effect. The museum was created to showcase computer art, and to combine traditional art and new technology so that both were seen as equally creative. The final product was exhibited at the local children's museum.

Students at the school are introduced to multimedia programming in the seventh grade as part of a required computer literacy course. The curriculum covers basic skills in keyboarding and the functions of databases, spreadsheets, telecommunications, and word processing software. It also introduces students to HyperCard, a multimedia software development tool. Students learn ways to use the computer to combine images, sound, text, and movies.



The virtual museum includes art by 26 students; two are pictured here with their work. Users can click on artwork for more information.

Beginning in the ninth grade, students can elect to take an interactive video course, learning to write computer programs in HyperCard. "The students *really* learn how to use a computer, learning skills they will need throughout high school and beyond," says instructor Paige Ewing.

Paige's instruction emphasizes problem solving, writing, drawing, and mathematics skills. For example, students determine the course of an airplane by plotting it with X-Y coordinates on a graph and then use the programming language to instruct the computer to display the animation in sequence. When something goes wrong, they have to troubleshoot the problem.

Technology is a high priority at the school, which has computer labs across the campus and provides each teacher with a classroom computer. Teachers can send e-mail throughout campus, gain access to the library's card catalog, and order library materials. In the near future, dormitories will be added to the online network and all computers will be connected to the Internet.

"The virtual museum project isn't just about art," says art teacher Bobbie Guerra. "The students have to organize many details and develop new technical skills. We're lucky to have the technology to do a project like this, and the staff on campus to train us and give us the support we need."

Resources

See Books on CD-ROM, page 20, for more about:

***Rosie's Walk*, a CD-ROM adaptation of the popular children's book with ASL and signed English supports, developed by Texas School for the Deaf**

Contact
Mari Liles
Texas School for
the Deaf
P.O. Box 3538
Austin, TX 78764
Tel: (512) 462-5407
(voice/TTY)

Equipment



- a Macintosh computer with 24 MB of memory
- a 250 MB internal hard drive
- a 230 MB external Bernoulli drive
- a flatbed scanner
- Adobe PhotoShop
- Adobe Premiere Fractal Painter
- Aldus Persuasion
- Macromedia Director
- Apple's QuickTime
- Canon Xapshot digital camera

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Getting All the Answers



School:
Como Park Elementary
School

Location:
St. Paul, Minnesota

**Participating
Students:**
All of the school's
seventy-five students,
ranging in age from
5 to 11.

Other:
Students are deaf
and hard-of-hearing.



Como Park's Discourse program started with a grant from a corporate foundation in St. Paul. When funding was terminated, the Saint Paul Public Schools invested in Discourse.

Contact
Leigh Nelson
Saint Paul Public
Schools
360 Colborne Street
Saint Paul, MN 55102
Tel: (612) 228-4347
(voicemail; deaf persons
can call through the
state relay service)

Como Park Elementary School is home to a computer network application called Discourse, which provides teachers with immediate feedback about what students are learning and thinking. For the past eight years, all of Como Park's deaf and hard-of-hearing students have participated daily in lessons using Discourse in one of the school's three labs. Why? The reason is simple: Their teachers love Discourse.

Each student works with a small terminal connected to the teacher's workstation at the front of the classroom. The teacher poses questions and students type their answers. Each student's response is displayed on the teacher's screen, next to the corresponding student's name.

For example, in a unit about categories, the teacher might show a list of types of animals, and ask, *Which are mammals?* In a lesson on punctuation, the teacher might write an unpunctuated sentence and instruct students to type it using correct punctuation.

The teacher can give both verbal and system-delivered feedback to those answering correctly. Small green lights on

either side of the student's terminal flash for positive feedback. Students' correct responses often vary, which fosters class discussion.

Discourse is flexible in its use. A teacher can ask follow-up questions to students who miss an answer; provide alternate explanations; provide additional practice situations; display one or more answers, with or without the students' names, on a large classroom

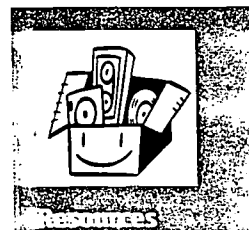
video monitor; print responses for reviewing later; or simply move on. She can also provide group or individual printed reports.

Como Park teachers say Discourse:

- serves all ages and subjects.
- focuses students and increases time on task.
- allows for open-ended questions.
- allows for a response every time from every student.
- accommodates classes whose students have widely varying abilities.
- adapts to use with other media, such as video, transparencies, and handouts.
- permits self-paced or timed work.
- requires little training or preparation time.
- aids in administering group tests and generating automatic scores and reports.
- reinforces computer literacy and keyboarding skills.

Teachers at Como Park have begun using Discourse more regularly for ongoing assessment of student progress. Discourse sessions can also be shared with parents, and used as a basis for planning an instructional program.

The specific amount of time needed for training varies from teacher to teacher, but teachers usually go through an initial 18–20 hour training session. On-site staff who specialize in Discourse technology and applications provide individual help to teachers, as well as training when software upgrades are done or when teachers believe they need a review. The staff also publish a newsletter about Discourse. There are 27 Discourse classrooms in the Saint Paul Public School system, and a contract with a service provider for technical support of those classrooms.



**See Classroom
Computer Networks,
page 18, for more
about:
Discourse**



In a lesson on fairy tales, teacher Mary Schultz poses questions to her class. Students use keyboards to reply individually.

Teaching the Teachers



School
Florida School for the
Deaf and Blind

Location
St. Augustine, Florida
Participating
Students
Four hundred and fifty
pre-K-12 students.

At many schools, learning to use technology is the *de facto* responsibility of individual, personally motivated teachers. The Florida School for the Deaf and Blind (FSDB) takes a different approach—programmatic in-service training. "We don't just throw a teacher in front of a computer," says John Mark Leach, the school's computer resource coordinator. "Our goal is to make teachers well informed consumers of software and hardware." Many teachers, indeed, develop into experts.

The day after school is out in June, Vicky Cooler is back teaching in the classroom. Her students are fellow teachers from FSDB and other schools throughout the state, and the subject is ClarisWorks: Beyond the Basics. Vicky, who is deaf, is one of several FSDB teachers who occasionally works as a technology

instructor, serving also as role model and mentor to other teachers. Teachers who serve as technology instructors receive stipends to plan their courses, prepare materials, and

instruct. The June workshops span several days and also cover the Internet, HyperStudio, and other teacher-requested topics.

In 1984, FSDB received a state grant to develop an in-service training program. The school hired John Mark and a small staff of educational technology experts. Ongoing learning for teachers has been a high priority ever since.

A mix of required and voluntary courses makes up FSDB's professional development plan, which is part of a five-year technology plan. John Mark regularly seeks feedback from teachers. "Our model is fluid, and changes each year [depending on teachers' needs]," he says. Besides the June workshops described, the following is representative:



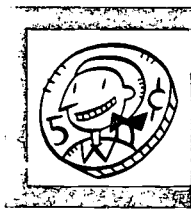
Teacher Vicky Cooler and computer resource coordinator John Mark Leach help students during a training workshop.

- Teachers who request a classroom computer make a two-year commitment to training, designed to make them independent with the equipment and knowledgeable in evaluating educational software. Teachers receive in-service points for participating.
- Technology and curriculum specialists meet weekly to address teachers' needs and coordinate solutions. The result is often an in-service day for teachers, who are released from classroom duties.
- The school offers special courses during the year. Teachers attend on a voluntary basis after school.
- Teachers may take further classes at St. Augustine Technical Center, with tuition paid by FSDB.
- Each February, FSDB sends teachers to the Florida Educational Technology Conference in Orlando.

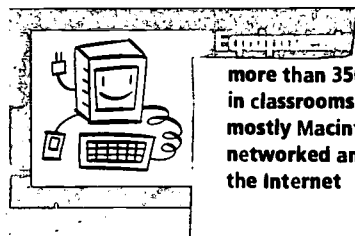
The school recognizes that learning to use technology well takes time, but considers such knowledge an essential part of each teacher's repertoire and the academic curriculum. A recent switch from traditional scheduling to block scheduling in the upper school has made it even easier for teachers to integrate technology into instruction. With four periods per day instead of seven, students have more time for group projects, research, and working with technology.

Funding

Technology at FSDB is frequently updated with support from state and private grants.



Contact
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Instructional Technology
Center
Florida School for the
Deaf and Blind
207 North San Marco
Avenue
St. Augustine, FL 32084
Tel: (904) 823-4480 (voice)
(904) 823-4461 (TTY)



more than 350 computers
in classrooms and labs,
mostly Macintosh,
networked and linked to
the Internet

Cyberteaching Science

School
Model Secondary
School for the Deaf

Location
Washington, D.C.

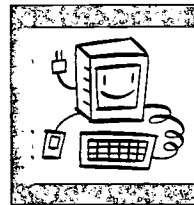
**Participating
Students**

Eight advanced
students in grades
eleven and twelve.

Other:
Students are hard-of-
hearing to profoundly
deaf.

The Internet is catching on in classrooms throughout the country, and science teachers are some of its most avid users. "I've become cyberhooked," states science teacher Mary Ellsworth on her personal World Wide Web home page.

Mary teaches science to advanced students at the Model Secondary School for the Deaf (MSSD). Her Internet interest got a boost from participation in the Earth Systems Science Community (ESSC) project. The project, directed jointly by Gonzaga College High School and ECologic Corporation in Washington, D.C.,



Equipment

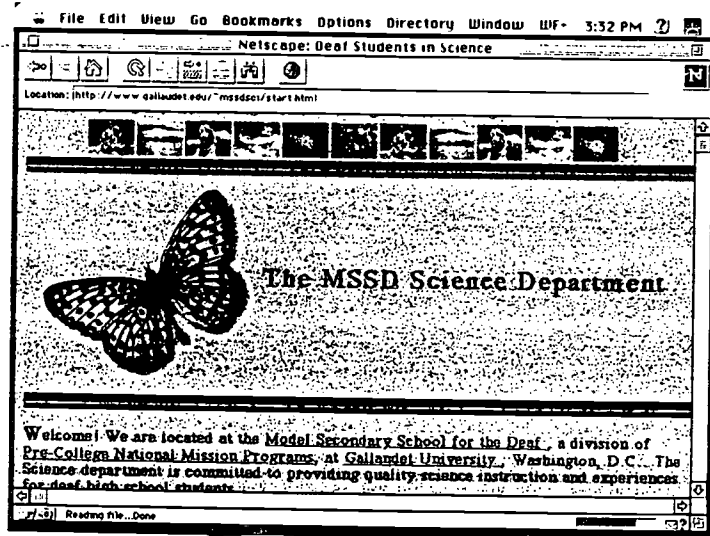
three Power Mac 7500
computers, all linked
to Gallaudet University's
campus network, and
from there to the Internet

average temperatures over the course of three decades, and graphed it as part of a unit on global warming. They found differing patterns in various areas of the country, and were able to experience first hand the difficulty of drawing conclusions about this elusive phenomenon. Students share their research results with other ESSC participants on the Internet and the Web.

Mary maintains a colorful and informative Web site about the Earth Systems Science Community Curriculum Project and participating MSSD students (<http://www.gallaudet.edu/~mssdsci/start.html>). It includes information about the ESSC, examples of student work, curriculum information, and profiles of participating MSSD students. Like all Web sites, Mary's is a work in progress.

"I start the ESSC unit by having students create their own Web pages as a means of familiarizing them with Web software," says Mary. High-speed access to the Internet is a crucial component to this program, made possible through Mary's participation in the ESSC.

Success with this program has spurred Mary on even further. "We've just received a grant from NEC Foundation," she says. "I'd like to buy a notebook computer, because a Web site is never done. I would like to be able to continue developing materials and exploring new ways to use the class's Web site after I go home at the end of the day."



The MSSD Science
Department web
page has many links.
Two are to the ESSC
Project and Role
Models: Deaf and
Hard-of-Hearing
Professionals in
Science.

involves 14 schools, with MSSD the only school for deaf children.

ESSC promotes direct investigation of scientific phenomena by students, making extensive use of technology. Teachers and students have access to National Aeronautics and Space Administration (NASA) data collected by satellites orbiting the earth, and to computer-generated visualization software that converts the data to images and graphs—all through the Web.

Students work in small groups to investigate systems such as climate modeling, ocean circulation, or global temperature and ozone distribution. One pair of students, for example, examined data on

Contact
Mary Ellsworth
Model Secondary
School for the Deaf
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5466
(voice/TTY)



The ESSC project is
funded by NASA.

What is the Internet?

The Internet is a worldwide network of millions of computers. The World Wide Web, also called simply the Web, is a subset of the Internet that provides graphics and allows users to link quickly to other locations for related information. Many schools maintain sites on the Web, along with a multitude of other organizations and individuals.

Raising Funds for Technology

While you've probably got some ideas for technology you'd like in your school, if you're like most of us, you may not be sure where to begin. This section will help you

- define your needs.
- present your ideas.
- find potential funders.

Defining Your Needs

Before you present your ideas to potential funders, be clear about your needs. A good way to define your needs is to answer the following questions (brainstorm with others, if possible):

- What specific classroom activities do you want to do? (*Example: I want my students to exchange letters with deaf and hearing adults.*)
- What are your objectives for your students? Why do you need technology to achieve those outcomes? (*Example: I want my students to develop and apply their reading and writing skills. E-mail exchanges, for example, encourage prompt responses and are authentic, yet allow time for feedback and editing.*)
- Why do you want to engage in these activities? (*Example: I want students to improve writing and reading skills while engaged in an activity that stimulates social contact.*)

You'll probably need to do some research to determine the specific technology you require and its cost. Ask your school or district technology specialist for more information and cost estimates.

Now you're ready to put your ideas into writing.

Presenting Your Ideas

So, you've got a great idea but you still need money to support it? The secret is to find people who are interested in funding projects like yours and then communicate your ideas to them.

Most funders require some kind of written proposal. This is a clear outline of the

need for and expected outcomes of your project, a detailed plan for the project itself, and a plan for evaluating project results. Proposals don't have to be long; five pages is often enough. They do have to be compelling, however. Do your homework. Write your proposal *before* approaching a funding source. You'll be better prepared for success.

Many books provide step-by-step guides to proposal writing. Ask your local librarian or bookstore for recommendations. The Associated Grantmakers Library has dozens of participating libraries around the country that specialize in providing funding-related information. Call The Foundation Center at (800) 424-9836, (in New York (212) 620-4230), to locate the branch nearest you, or visit its Web site (<http://fdncenter.org>).

Grant-writing workshops and seminars, while a little more expensive, can be a valuable way to focus on your proposal. Call the development office at a local college for suggestions.

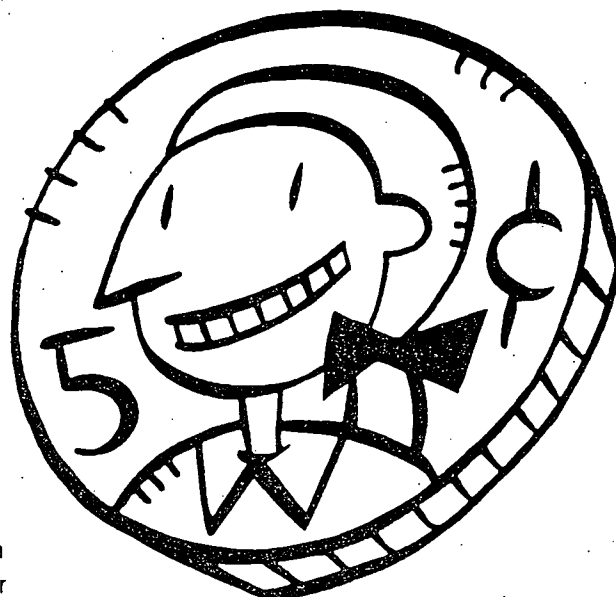
There are also many World Wide Web sites that offer on-line resources and technical help. Be aware that different search services will yield different results. Search using keywords: *proposal writing* and *grant making*. These sites often provide links and suggestions for potential funders.

One last tip: Ask another teacher or a parent to help you develop your proposal. In this case, two heads are better than one!

Finding Potential Funders

Potential funders include:

1 State and federal government agencies. The U.S. Department of Education is one example. Federal government funders often have the biggest budgets and demand very detailed proposals, often with rigorous evaluation components and fixed deadlines. To visit them on-line, go to their Web site (<http://www.ed.gov>) or read the current



Catalog of Federal Domestic Assistance and *Federal Register* at your local library.

2 Corporate or charitable foundations.

To find a possible corporate or charitable foundation, look around your school's city. Investigate who the area's major employer is and who has funded other local projects. Call them up and ask them for guidelines to their charitable giving programs. If they don't have any guidelines, ask for their annual report and see if you can determine their charitable interests.

3 Individual donors. Individual donors are responsible for 85 percent of all giving in the United States. They are usually found through personal acquaintances. If appropriate, you may want to solicit a student's parent or a person in your town who is known to be interested in supporting particular kinds of students or programs.

Don't give up after the first try. If your first contact with a potential funder isn't successful, politely ask why. Use this information to more effectively present your ideas to the next funder.

Remember: Funders *want* to fund worthy projects. If your project is worth funding, keep working. Your students will thank you.

Selected Resources

The following resources are either related to the stories in this handbook, were developed in part by deaf children, or were developed under federal grants. Relevant commercial software is also included.

- 2** Listings with this symbol indicate page numbers of stories relating to the resource.



This symbol indicates federally funded resources.

Technological resources are constantly evolving. These are available as of July 1996.

Materials to Help You Teach

Telecommunications

- 2** Curriculum objectives resulting from Project TFA: Telecommunications For All cover fax, TTY, telephone relay service, and electronic network communication. The materials encompass three areas of instruction—equipment operation, concept of technology, and interactive pragmatics—and will be available in 1997.

Contact

Barbara Virvan
Technology Assessment Program
Department of Communication Arts
Gallaudet University
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5257 (voice/TTY)
Fax: (202) 651-5476

- 2** This 18-minute videotape, *Independence Through Telecommunications: A Guide for Parents of Deaf and Hard-of-Hearing Children*, explains how visual telecommunications technology can provide deaf and hard-of-hearing children access to the telephone. A product of Project TFA: Telecommunications For All, the videotape includes explanations and testimonials from parents of deaf and hard-of-hearing children who use visual communications devices. Relay services, TTYs, fax machines, and on-line services are among the topics covered.

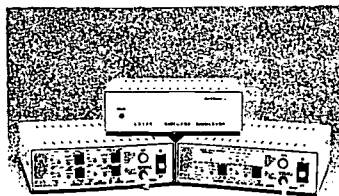
Contact

Gallaudet Research Institute
Dissemination Office
Hall Memorial Building
Gallaudet University
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5575 (voice/TTY)
Fax: (202) 651-5746

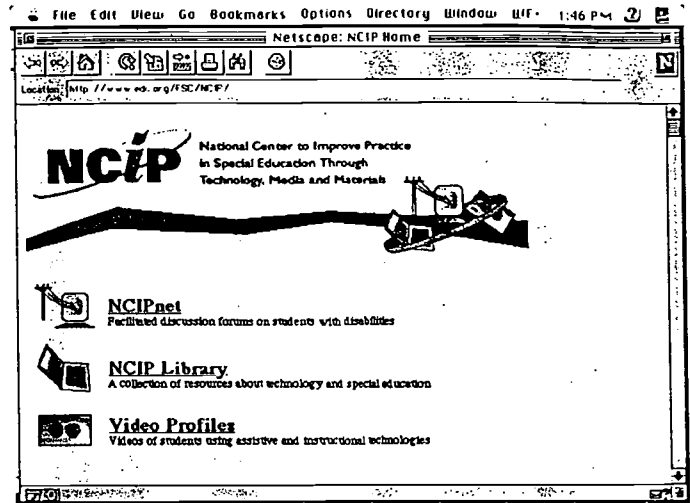
- 2** One source of telephone line simulators, used in Project TFA: Telecommunications For All, is Jensen Tools, Inc.

Contact

Jensen Tools, Inc.
7815 South 46th Street
Phoenix, AZ 85044-5399
Tel: (800) 426-1194 (voice)
Fax: (800) 366-9662



Telephone line simulator



World Wide Web home page for the National Center to Improve Practice

Videotape Captioning

- 6** WGBH has explored and researched ways students can enhance learning by making their own captioned videotapes. One result is *iCaptioning Kids!*, a videotape showing how students and teachers use captioning in three classrooms. A 16-page idea book suggests many ways to use video, word processing, and captioning technology to promote interactive, hands-on learning and access to media. The book details the captioning process and provides tips for teachers.

Contact

Mardi Loeterman
CPB/WGBH National Center for Accessible Media
125 Western Avenue
Boston, MA 02134
Tel: (617) 492-9258 (voice/TTY)
Fax: (617) 782-2155

Internet

- 7** EDUDEAF is an electronic discussion group, known as a listserv, on the Internet for educators and parents of deaf and hard-of-hearing children. The discussion is facilitated by Cathy Brandt, a teacher in Lexington, Kentucky, who started the list in 1995. To subscribe, send an e-mail message to the address and leave the subject line empty. In the body of the message, type *sub edudeaf [firstname] [lastname]*. You will receive messages from and can contribute to daily discussions.

Address

listserv@lsv.uky.edu

- The National Center to Improve Practice in Special Education Through Technology, Media and Materials has a World Wide Web site that includes print and video resources on technology and special education, discussion forums facilitated by experts in the field, and links to other Web sites. The site focuses on topics such as early childhood technology and assistive technology.

Address

<http://www.edc.org/FSC/NCIP/>

Classroom Computer Networks

- 9** *Making English Accessible: Using Electronic Networks for Interaction in the Classroom* by Joy Kreeft Peyton and Martha French. This book tells how the ENFI network operates and how it can be integrated into the classroom.

Contact

Gallaudet University Bookstore
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5380 (voice/TTY)
Fax: (202) 651-5489

- 14** Information on the computer network application Discourse is available from the network's manufacturer.

Contact

Discourse Technologies, Inc.
8050 N. Port Washington Road
Milwaukee, WI 53217
Tel: (800) 421-0941 (voice)
(414) 352-5595 (voice)
Fax: (414) 352-6366

Multimedia Demonstrations

11 A 32-minute videotape includes presentations by eight Project ALIVE! teachers showing multimedia programs they and their students have created.

Contact
Cynthia M. King
Gallaudet University
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5897 (voice)
(202) 651-5685 (TTY)
Fax: (202) 651-5710

Computer Notetaking Software

● Project CONNECT (Content-area-literacy via Networked Notetaking for Exceptional Children and Teachers) has compiled a dissemination kit. It includes a videotape and articles illustrating a computer-based notetaking system for deaf students. The system uses wireless laptop computers and allows notes taken by someone else to be seen by students in real time. Students can interact with the notetaker. The kit includes recommendations for notetakers.

Contact
Lynne Anderson-Inman
Center for Electronic Studying
College of Education
5265 University of Oregon
Eugene, OR 97403-5265
Tel: (541) 346-2544 (voice)
(541) 346-1021 (TTY;
messages only)
Fax: (541) 346-2565

Books on Computer

● A dissemination kit that includes sample software with excerpts from interactive computer books designed specifically for students who are deaf and hard of hearing is offered by Project LITERACY-H (Literacy Improvement via Text Enhancements and Reading Assistance for Children and Youth with Hearing Impairments). It also contains articles on the use of these books and recommendations for evaluating and creating electronic books for this population.

Contact
Lynne Anderson-Inman
Center for Electronic Studying
College of Education
5265 University of Oregon
Eugene, OR 97403-5265
Tel: (541) 346-2544 (voice)
Fax: (541) 346-2565

Software Evaluation

● Software To Go is designed to help educators locate and evaluate computer software for deaf students. A book contains hundreds of evaluations by teachers across the United States and Canada and includes a guide to software publishers. A service offers a lending library of all the software outlined in the book and includes a catalog with supplements and newsletters.

Contact
Software To Go
Gallaudet University
M5SD Box 77
800 Florida Avenue, NE
Washington, DC 20002
Tel: (202) 651-5705 (voice)
(202) 651-5758 (TTY)
Fax: (202) 651-5109

Video caption
made with ULTimate
CaptionWorks
software.

Materials Your Students Can Use

Captioning Software

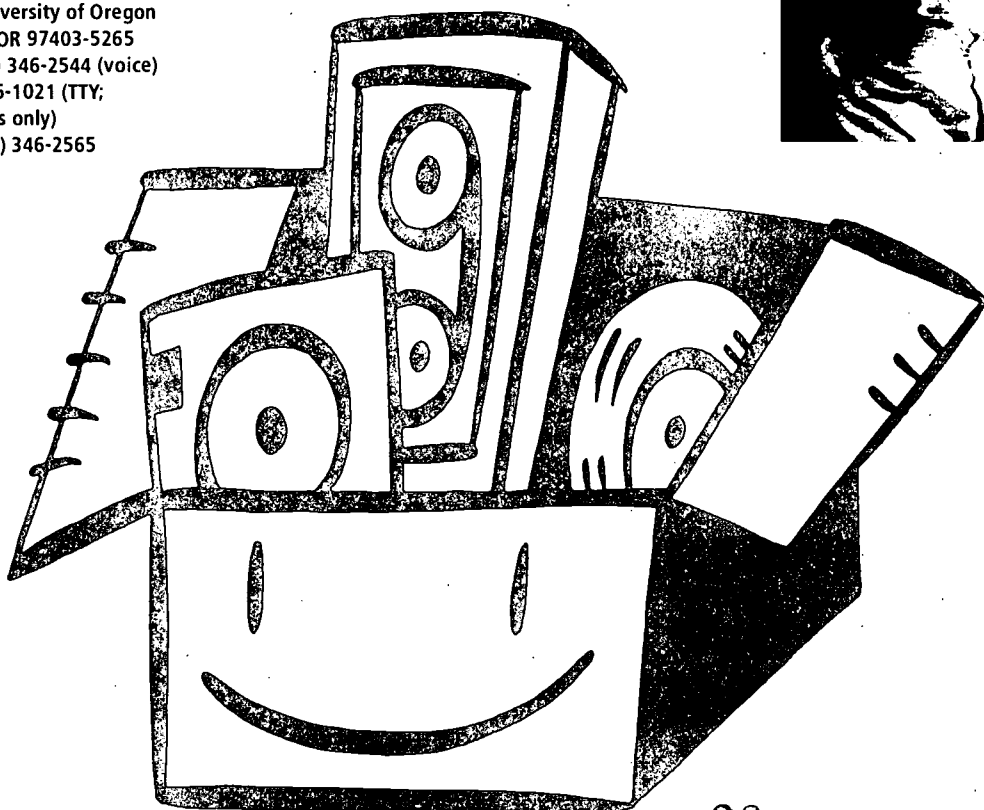
6 ULTimate CaptionWorks is captioning software for the Macintosh designed with input from educators of deaf students and from students themselves. Open captions can be any color, any size, any font, and placed anywhere on the screen. The text may be placed in a traditional box or in a cartoon bubble with a pointer to the speaker. Besides text, captions can include graphics. Special equipment is needed.

Contact
Universal Learning Technology
39 Cross Street
Peabody, MA 01960
Tel: (508) 538-0036 (voice)
(508) 538-3110 (TTY)
Fax: (508) 531-0192



6 QuickCaption School is a child-friendly text editor with built-in captioning capability. It creates open captions and is designed for younger students or those new to keyboarding and word processing. Its main feature is extra-large text; there are no word processing functions besides cursor movements. This software is for DOS on the PC.

Contact
Geoff Freed
CPB/WGBH National Center for Accessible Media
125 Western Avenue
Boston, MA 02134
Tel: (617) 492-9258 (voice/TTY)
Fax: (617) 782-2155



6 QuickCaption for Word is software for creating open-captioned videotapes. It operates with Microsoft Word, using Windows 3.x or Windows 95. Students and teachers create text and add it to videotape using specialized equipment.

Contact
Geoff Freed
CPB/WGBH National Center for Accessible Media
125 Western Avenue
Boston, MA 02134
Tel: (617) 492-9258 (voice/TTY)
Fax: (617) 782-2155

6 CAP-Media Tools is software that allows users without extensive computer experience to create interactive media. The software consists of captioning and authoring tools. The source can be laserdisc, digital video, CD audio, or digital audio; videotapes must be converted to digital video before they can be captioned. The software operates within Windows 3.1 or Windows 95. An eight-minute videotape demonstrates CAP-Media Tools, its instructional uses, and the importance of accessible media.

Contact
CAP-Media, Inc.
5234 Killens Pond Road
Felton, DE 19943
Tel: (302) 678-1877 (voice/TTY/fax)

Captioned Videotapes

● This free loan service, Captioned Films/Videos Program, provides open-captioned films and videotapes ranging from educational titles to Hollywood releases. The educational collection contains 3,000 curriculum-based titles, to which 100 new titles are added annually. Each videotape is accompanied by a teacher's guide. All users must register before borrowing.

Contact
Captioned Films/Videos Program
National Association of the Deaf
1447 East Main Street
Spartanburg, SC 29307
Tel: (800) 237-6213 (voice)
(800) 237-6819 (TTY)
Fax: (800) 538-5636

Books on Videotape

● The Novel Signs project has produced a set of ASL videotapes for students, that are literal, unabridged translations of fiction. Each title includes a videotape, the original book, and a teacher's guide. *The Napping House* (22 minutes), a classic children's picture book for young readers, is signed and dramatized by students. *Tuck Everlasting* is a five-hour videotape set.

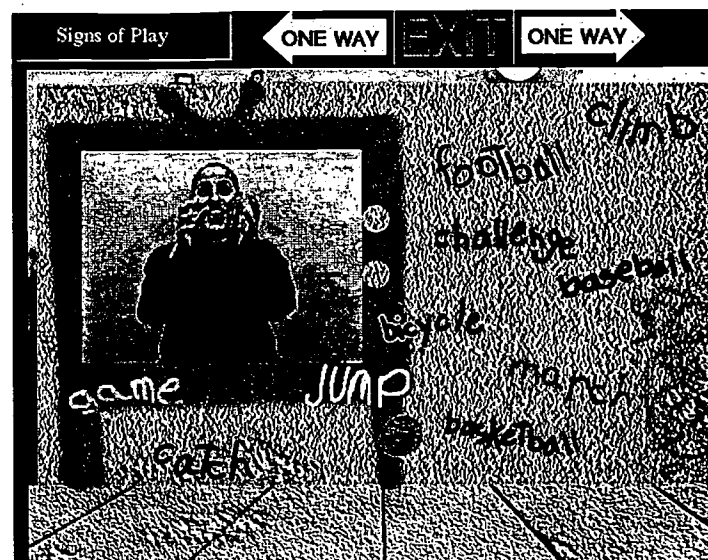
Contact
Doris Corbo or Alexandra Hans
Horace Mann School for the Deaf and Hard of Hearing
40 Armington Street
Allston, MA 02134
Tel: (617) 635-8534 (voice)
(617) 783-3664 (TTY)
Fax: (617) 635-7942

● The Kansas School for the Deaf has produced a series of videotapes, Visual Storyreading in American Sign Language, that provides deaf students with opportunities to see books presented in ASL. The school researched criteria for selecting books to be read and developed suggestions for translating those books from English into ASL for preschool through middle school. A team of native signers collaborates on the translations and signs them on videotape. The first series of 25 videotapes is complete and more are in production.

Contact
Pam Carson Shaw
Kansas School for the Deaf
450 East Park Street
Olathe, KS 66061
Tel: (913) 791-0573 (voice/TTY)
Fax: (913) 791-0577

Books on CD-ROM

13 Based on Pat Hutchins' picture book for young children, *Rosie's Walk* is told in text, voice, ASL, and signed English—complete with animations and sounds. Developed by a multimedia team at the Texas School for the Deaf, the CD-ROM is available for Macintosh and PC platforms. The package includes a teacher's guide, a user's guide, an activities book, and both a word and picture flipbook. Other CD-ROMs are in production.



A screen from *StreetsSigns* CD-ROM shows a student signing *catch*.

Contact
Gerald Pollard
Texas School for the Deaf
P.O. Box 3538
1102 South Congress Avenue
Austin, TX 78764
Tel: (512) 462-5353 (voice/TTY)
Fax: (512) 462-5313

Personal Communication

● The Personal Communicator is a CD-ROM to help deaf students communicate with hearing people, using either a laptop or stationary computer. Users can see video of an interpreter signing, or hear the computer speak a word or phrase while they see the written word(s) on the screen. The four primary interlinked components include ways to communicate with others, check word meanings and signs, access previous conversations, and store various modes of writing. Version 2.0 will be available in September 1996 for both the Macintosh and Windows.

Contact
Cindy Greenwood
Comm Tech Lab
Communication Arts and Sciences Building
Michigan State University
East Lansing, MI 48824
Tel: (517) 355-3410 (voice)
(517) 353-0722 (TTY)
Fax: (517) 432-1244

ASL Resource Software

10 *StreetsSigns: A City Kid's Guide to American Sign Language* is computer software on CD-ROM that includes more than 650 words divided into 24 thematic categories inspired by the Big Apple. For example, on "Wall Street," users find number signs and at the "United Nations," signs for foreign countries. Users click on a vocabulary word and then see a video clip of the corresponding sign demonstrated by a student.

Contact
Susan Abdulezer
Junior High School 47
225 East 23rd Street
New York, NY 10010
Tel: (212) 679-1360 (voice)
(212) 481-0300 (voice/TTY)
Fax: (212) 679-1358

● One thousand basic ASL signs in QuickTime video from three angles are available in *The Multimedia Dictionary of American Sign Language* CD-ROM. This CD-ROM also supports finger-spelling skills through graphically-rendered signs for the letters of the alphabet and for numbers one through ten. Students at Oregon School for the Deaf created this CD-ROM, with help from Intel Corporation and Apple Computer.

Contact
Robert Scheffel
DeafTECH
Oregon School for the Deaf
999 Locust Street, NE
Salem, OR 97304
Tel: (503) 378-2257 (voice/TTY)
Fax: (503) 373-7879

Acknowledgments

Success Stories: Deaf and Hard-of-Hearing Students Learning with Technology & Media was developed from results of a survey described briefly on the inside front cover. It was the third of three surveys conducted as part of a federally funded project, **Captioned Media and Educational Technology: Research into Contemporary School Practice**. Our first survey, **Instructional Technology in Schools Educating Deaf and Hard-of-Hearing Children**, collected data from 546 schools regarding inventories of equipment, presence of technical support, and technical needs of the schools. The results are published in the Reference 1996 edition of *American Annals of the Deaf* (Vol. 141, No. 2). The **Captioned Media and Educational Technology Survey** collected information from 212 teachers regarding their use of captioned media in the classroom. The results were presented in December 1995 at a conference on the future of captioning; proceedings are available from Judith Harkins at the address on the inside front cover.

We would like to thank the many educators who opened their schools and classrooms to us and who fielded endless phone calls. Their excellent work and commitment to children are at the heart of these case studies.

Ashland Elementary School – Cathy Brandt and her students. California School for the Deaf in Riverside – Todd Rutherford. CAPS Collaborative at Reingold Elementary School – Sheila Donahue. Como Park Elementary School – Leigh Nelson, Mary Schultz, Sara Benedict, Kathy Corbett. Florida School for the Deaf and Blind – John Mark Leach, Vicky Cooler, Hugh Lewis, and staff. Frost Middle School – Gretchen Kingan. Gallaudet University – Cynthia King. Governor Baxter School for the Deaf – Sally Gatehouse. Houlton High School – Julie Dunn Brown and her students. Junior High School 47 – Susan Abdulezer and Terry Cambridge. Kendall Demonstration Elementary School – Yetti Sinnreich. The Learning Center for Deaf Children – Susan Dulgov and the family of Betsy, Doug, and Luke Roberts. Maryland School for the Deaf – Mary Sue Boxer. Model Secondary School for the Deaf – Mary Ellsworth. San Francisco Hearing and Speech Center – Mary Ann Younger, Jeanne Hirota, and Pamela Hefner. Susquehanna Township Middle School – Kathleen Eich. Texas School for the Deaf – Gerald Pollard, Mari Liles, Paige Ewing, Marvin Sallop, Bobbie Guerra and her students, especially Shayne Blalock. University of Maine – Barbara Keefe. University of Minnesota – Steve Robinson. W. T. Woodson High School – Rosemary Stifter.

Success Stories is available in alternate formats for people who are visually impaired. Call NCAM at (617) 492-9258 (voice/TTY).

The CPB/WGBH

NCAM
National Center for Accessible Media

Captioned Media and Educational Technology: Research into Contemporary School Practice

Project Directors

Mardi Loeterman,
CPB/WGBH National Center
for Accessible Media (NCAM)

Judith Harkins,
Gallaudet University

Success Stories:

Deaf and Hard-of-Hearing Students Learning with Technology & Media

This handbook was developed by the Educational Print and Outreach department of the Special Telecommunications Services division, WGBH Educational Foundation.

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Ordering Information

To order additional copies of *Success Stories*, for \$3 each, plus shipping, contact:

Gallaudet University Bookstore
800 Florida Avenue, NE
Washington, DC 20002-3695
Tel: (202) 651-5380 (voice/TTY)
Fax: (202) 651-5489

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U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
Educational Resources Information Center (ERIC)



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